First Results of the Metric Solar Radio Burst Observation System of Tohoku University

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In the solar corona, there are many particle acceleration phenomena which are caused by the interactions between strong magnetic field and the high temperature plasma above 1 MK. Non-thermal electrons accelerated in coronal acceleration processes emit radio waves in the meter wavelength range. Thus radio observations are very effective method to study particle dynamics in the solar corona. In addition, coronal radio emission mechanisms itself have not been understood well. Therefore the monitoring observation of solar radio bursts is important for the study of not only particle accelerations but also radio emissions.

It is easy to observe spectra of solar radio bursts since they are much stronger than the other natural radio phenomena. Many previous studies have put greater emphasis on a continuous observation than high time and frequency resolution observations. On the other hand, new observation results of the solar corona are provided from high sensitivity or high resolution observations at visible light, EUV, and X-ray observations in these days. Now, high sensitivity and high time and frequency resolutions are considered to be important and required also on solar radio spectrum observations.

Iitate Planetary Radio Telescope (IPRT) is a ground based radio telescope of Tohoku University set at the Iitate observatory in Fukushima prefecture in Japan. A physical aperture of the IPRT is 1023 square meter so the IPRT realizes very high sensitivity observations. We have newly developed a radio observation system to observe solar radio bursts with sufficient frequency range and high time and frequency resolutions. This system enables to observe solar radio bursts in the frequency range between 100 MHz and 500 MHz. Minimum detectable sensitivity in the observation frequency range is better than 0.7 S.F.U. with 10 ms time resolution and 61 kHz frequency resolution. This system also enables to observe left and right polarization components simultaneously.

We have started continuous observations of the Sun from September 2009. We observed solar radio bursts for the first time when the C class flare was occurred on December 16, 2009. Many solar radio bursts have been observed until now. Some observed solar radio bursts have fine spectrum structures or time variation of polarization characteristics. The observation system and observation results are introduced in this presentation.